AUTOMATIC SYSTEMS
LABORATORIES INC.

B550 / B700

Metal Block Calibrator

Operator's Handbook

MP MASTER

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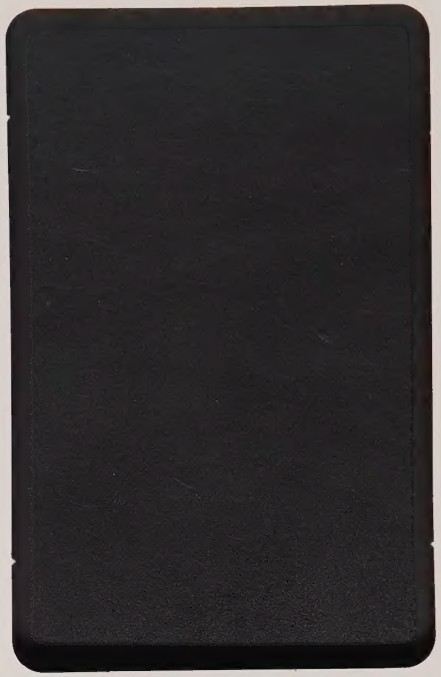

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ENGLISH IMPORTANT SAFETY INFORMATION 22/1/97

GENERAL

This instrument has been designed and tested to comply with the Electromagnetic Compatibility Directive 89/336/EEC and Low Voltage Directive 93/68EEC in accordance with EN 61010 -1 :1995 relating to the safety requirements for electrical equipment for measurement, control and laboratory use.

Before connecting the instrument to the mains supply please ensure the following safety precautions have been read and understood.

SAFETY SYMBOLS

The following symbols are used to describe important safety aspects of this instrument, these symbols appear on the instrument and in the operation instructions.

Attention Symbol: Indicates a potentially hazardous condition exists and that it is necessary for the operator to refer to the instruction manual to ensure the safe operation of this instrument.

Hot Surface Warning: Indicates a hot surface that may be at a temperature capable of causing burns, refer to the instruction manual for further safety information.

Caution Risk of Electric Shock: Indicates hazardous voltages may be present, refer to the instruction manual for further safety information.

Protective Conductor Terminal: For protection against electrical shock during a fault condition. This symbol is used to indicate terminals that must be connected to electrical ground before operating equipment.

SUMMARY OF SAFETY PRECAUTIONS

The following general safety precautions must be observed while operating or servicing this instrument. Failure to comply with these precautions may result in personnel injury or death.

INSTRUMENT ELECTRICAL EARTH

This instrument is designed as a Class I electrical safety insulation device. To ensure continued protection from electric shock the instrument chassis must be connected to an electrical ground. The instrument is supplied with an AC power cable with an earth connection.

LIVE CIRCUITS DANGER

Do not connect the power supply to or operate this instrument with the protective covers removed. Component replacement and internal adjustments must be made by qualified service personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist with the power cable removed. To avoid injuries always disconnect power and discharge circuits before touching them.

DO NOT MODIFY THIS INSTRUMENT OR SUBSTITUTE PARTS

Because of the danger of introducing additional hazards; do not perform any unauthorized modification or install substitute parts to the instrument. Only fuses with the rated current, voltage and specified type should be used, failure to do so may cause an electric shock or fire hazard. Return the instrument to Automatic Systems Laboratories for service and repair to ensure the safety features are maintained.

DO NOT OPERATE IN EITHER DAMP OR EXPLOSIVE ENVIRONMENTS

This instrument is not designed to operate while wet, in an environment of condensing humidity or in the presence of flammable gases or vapors. The operation of this instrument in such an environment constitutes a safety hazard.

HOT SURFACES DANGER

Equipment marked with a Hot Surface warning symbol should be regarded as operating at temperatures capable of causing burns. Do not touch, handle or transport hot components or liquids until they are at safe temperatures. Care should be taken not to spill or splash water or volatile fluids on or into hot surfaces or liquids.

CERTIFICATION

Automatic Systems Laboratories certifies that this product met its published specifications at the time of shipment from our factory. All calibration measurements performed in the manufacture of this instrument are traceable to the National Physical Laboratory (London).

ASSISTANCE

For after sales support and product service assistance please contact Automatic Systems Laboratories Customer Support Group. Contact information is provided in the operation instruction manual.

GERMAN WICHTIGE SICHERHEITSINFORMATIONEN 22/1/97

ALLGEMEIN

Dieses Gerät wurde so entworfen und getestet, daß es der Elektromagnetischen Verträglichkeits-Richtlinie 89/336/EEC und der Niederspannungs-Richtlinie 93/68EEC in Übereinstimmung mit EN 61010 -1 :1995 bzgl. der Sicherheitsanforderungen für elektrisches Gerät zum Messen, Regeln und für den Laborgebrauch entspricht.
Bevor das Gerät an das Stromnetz angeschlossen wird, stellen Sie bitte sicher, daß die folgenden Sicherheitsvorkehrungen gelesen und verstanden worden sind.

SICHERHEITSSYMBOLE

Die folgenden Symbole werden zur Beschreibung wichtiger Sicherheits-aspekte für dieses Gerät benutzt. Diese Symbole erscheinen auf dem Instrument und in den Betriebsanleitungen.

Achtung-Symbol: Zeigt an, daß ein potentiell gefährlicher Zustand besteht und daß es für den Betreiber notwendig ist, sich in der Betriebsanleitung zu informieren, um den sicheren Betrieb dieses Geräts zu gewährleisten.

Warnsymbol "Heiße Oberfläche": Zeigt eine heiße Oberfläche mit einer Temperatur an, die zu einem Brand führen könnte. Lesen Sie bitte die Betriebsanleitung für weitere Sicherheits-informationen.

Risiko eines Elektrischen Schlages: Zeigt an, daß gefährliche Spannungen auftreten können. Lesen Sie bitte die Betriebsanleitung für weitere Sicherheitsinformationen.

Schutzleiteranschluß: Zum Schutz gegen einen elektrischen Schlag während eines Störungs-zustands. Mit diesem Symbol sind Anschlüsse gekennzeichnet, die vor der Inbetriebnahme des Geräts an die elektrische Erdung angeschlossen werden müssen.

ZUSAMMENFASSUNG DER SICHERHEITSVORKEHRUNGEN

Die folgenden allgemeinen Sicherheitsvorkehrungen müssen während des Betriebs bzw. der Wartung dieses Instruments befolgt werden. Das Versäumnis, diese Vorkehrungen zu befolgen, kann zu Körperverletzungen oder zum Tod führen.

ELEKTRISCHE ERDUNG DES GERÄTS

Dieses Gerät ist gemäß der Isolationsklasse 1 konstruiert. Um fortlaufenden Schutz gegen elektrische Schläge zu gewährleisten, muß das Gerätechassis an eine elektrische Erdung angeschlossen werden. Das Gerät wird mit einem Wechselstromkabel mit Schutzleiteranschluß geliefert.

GEFAHR DURCH SPANNUNGSFÜHRENDE STROMKREISE

Schließen Sie dieses Gerät nicht an das Stromnetz an oder betreiben es, während die Schutzabdeckungen entfernt sind. Komponentenersatz und interne Geräteeinstellungen dürfen nur von autorisiertem Wartungspersonal ausgeführt werden. Unter bestimmten Bedingungen können gefährliche Spannungen bestehen, während das Stromkabel entfernt ist. Zur Vermeidung von Verletzungen unterbrechen Sie vor jedem Berühren interner Komponenten die Stromzufuhr und nehmen Sie einen Potentialausgleich vor.

VERÄNDERN SIE DIESES GERÄT NICHT UND ERSETZEN SIE KEINE TEILE

Um die Entstehung zusätzlicher Gefahrenquellen zu vermeiden, nehmen Sie bitte keine ungenehmigten Modifikationen vor und installieren Sie keine Ersatzteile in dieses Gerät. Nur Sicherungen mit der angegebenen Strom- und Spannungsstärke und des spezifizierten Typs dürfen benutzt werden. Versäumnis dies zu tun, kann zu elektrischem Schlag oder Feuergefahr führen. Zur Wartung und Reparatur schicken Sie das Gerät bitte an Automatic Systems Laboratories zurück, um sicherzustellen, daß alle Sicherheitseigenschaften erhalten bleiben.

NICHT IN FEUCHTEN ODER EXPLOSIVEN UMGEBUNGEN BETREIBEN

Dieses Gerät ist nicht dazu ausgelegt, bei Feuchtigkeit, in einer Umgebung mit Kondensationsfeuchtigkeit oder im Bereich entzündbarer Gase oder Dämpfe betrieben zu werden. Das Betreiben des Gerätes in einer solchen Umgebung stellt eine Sicherheitsgefahr dar.

GEFAHR DURCH HEISSE OBERFLÄCHEN

Geräte, die mit dem Warnsymbol "Heiße Oberfläche" markiert sind, können Betriebstemperaturen erreichen, die zu Verbrennungen führen können. Berühren bzw. transportieren Sie heiße Komponenten oder Flüssigkeiten erst bei einer sicheren Temperatur. Schütten oder spritzen Sie kein Wasser oder verdunstende Flüssigkeiten auf heiße Oberflächen oder in heiße Flüssigkeiten.

ZERTIFIZIERUNG

Automatic Systems Laboratories bescheinigt, daß dieses Produkt die veröffentlichte Spezifikation zum Verladezeitpunkt ab unserem Werk eingehalten hat.
Alle bei der Herstellung dieses Produkts ausgeführten Kalibrierungen können bis zum National Physical Laboratory (London) rückverfolgt werden.

HILFELEISTUNG

Bitte wenden Sie sich an den Automatic Systems Laboratories Kundenservice (Customer Support Group) zur Unterstützung nach dem Kauf und zur Produktwartungshilfe. Kontaktinformationen finden Sie in der Betriebsanleitung.

FRENCH INFORMATIONS IMPORTANTES SUR LA SECURITE 22/1/97

INFORMATIONS GENERALES

Cet instrument a été conçu et testé pour être conforme à la directive de compatibilité électromagnétique 89/336/CEE et à la directive de basse tension 93/68CEE, en accord avec la norme EN 61010 -1 :1995 relative aux prescriptions de sécurité des équipements électriques de mesure, de contrôle et d'utilisation en laboratoire.

Avant de brancher cet instrument sur le secteur, veuillez vous assurer d'avoir lu et compris les mesures de sécurité suivantes.

SYMBOLES DE SECURITE

Les symboles suivants sont utilisés pour décrire des aspects importants sur la sécurité de cet instrument. Ils apparaissent sur l'instrument et dans les instructions de fonctionnement.

Symbole d'attention : indique l'existence d'une conditionpotentiellement dangereuse, et la nécessité pourl'opérateur de se référer au manuel d'instruction afin d'assurer le fonctionnement en sécurité de cet instrument.

Avertissement de surface chaude : indique une surfacechaude dont la température peut provoquer des brûlures.Consultez le manuel d'instruction pour de plus amples informations sur la sécurité.

Attention. Risque d'électrochoc : indique l'existence éventuelle de tensions dangereuses. Consultez le manueld'instruction pour de plus amples informations sur la sécurité.

Terminal de fil neutre : pour la protection contre lesélectrochocs lors d'une condition défectueuse. Ce symbole est utilisé pour indiquer les terminaux devant être connectés à la terre électrique avant d'utiliser le matériel.

RESUME DES MESURES DE SECURITE

Les mesures de sécurité générales suivantes doivent être respectées lors de l'utilisation ou de l'entretien de cet instrument. Le non respect de ces mesures peut entraîner les blessures ou la mort du personnel.

TERRE ELECTRIQUE DE L'INSTRUMENT

Cet instrument est conçu comme appareil d'isolation de sécurité électrique de classe 1. Pour assurer une protection continue contre les électrochocs, le châssis de l'instrument doit être connecté à une terre électrique. L'instrument est fourni avec un câble d'alimentation de courant alternatif (CA) de contact à la terre.

DANGER DES CIRCUITS SOUS TENSION

Ne branchez pas l'alimentation électrique à cet instrument, ou n'utilisez pas cet instrument sans les enveloppes protectrices. Le remplacement des composants et les ajustements internes doivent être faits par un personnel de surveillance qualifié. Ne remplacez pas les composants lorsque le câble d'alimentation est connecté. Sous certaines conditions, des tensions dangereuses peuvent exister lorsque le câble d'alimentation est retiré. Pour éviter des blessures, déconnectez toujours le courant électrique et déchargez les circuits avant de les toucher.

NE MODIFIEZ PAS CET INSTRUMENT OU NE REMPLACEZ PAS DE PIECES

A cause du risque d'introduction de dangers supplémentaires, n'effectuez aucune modification non autorisée, ou n'installez aucune pièce de substitution sur l'instrument. Seuls les fusibles de courant normal, de tension nominale et de type spécifié doivent être utilisés. Le non respect de cette condition peut provoquer un électrochoc ou un risque d'incendie. Renvoyez l'instrument à Automatic Systems Laboratories pour son service et sa réparation, afin d'assurer que les fonctions de sécurité sont maintenues.

N'UTILISEZ PAS CET INSTRUMENT DANS DES ENVIRONNEMENTS HUMIDES OU EXPLOSIFS

Cet instrument n'est pas conçu pour une utilisation s'il est humide, dans un environnement d'humidité de condensation ou en présence de gaz ou de vapeurs inflammables. L'utilisation de cet instrument dans un tel environnement représente un danger pour la sécurité.

DANGER DES SURFACES CHAUDES

Le matériel marqué d'un symbole d'avertissement de surface chaude doit être regardé comme fonctionnant à des températures capables de provoquer des brûlures. Ne touchez pas, ne manipulez pas ou ne transportez pas des composants ou des liquides chauds tant qu'ils ne sont pas à des températures sûres. Faites attention de ne pas renverser ou asperger de l'eau ou des fluides volatiles sur ou dans des surfaces ou des liquides chauds.

CERTIFICATION

Automatic Systems Laboratories certifie que ce produit répondait aux spécifications publiées au moment du départ de notre usine. Toutes les mesures de calibrage effectuées lors de la fabrication de cet instrument peuvent être trouvées au National Physical Laboratory (à Londres).

ASSISTANCE

Pour un support après-vente et une assistance de maintenance du produit, veuillez contacter le groupe d'assistance client d'Automatic Systems Laboratories. Des informations de contact sont données dans le manuel d'instruction sur le fonctionnement.

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1. Introduction

Automatic Systems Laboratories would like to thank you for purchasing this B series Metal Block Calibrator. The Calibrator is supplied in a fully operational state, but ASL strongly suggest that these brief operating instructions and guidelines be read before starting to use the apparatus. Should you have any difficulty understanding the instructions, or other questions regarding this Calibrator, please call our Customer Support Group.

2. Safety

WARNING

This apparatus is capable of reaching high temperatures. Severe burns may result through careless or negligent use. ASL suggests that only authorised personnel have access to the Calibrator. This Calibrator has been configured at ASL, only change the configuration settings after reference to this handbook. Please follow the guidelines below as a minimum procedure for safe operation.

ASL Metal Block Calibrators are fitted with an over temperature cut out which is operated by:

a. Excessive block temperature

b. The controller entering an alarm condition

To reset the calibrator press the start switch. If the light does not go out the fault condition still exists. Allow the calibrator to cool before retrying.

If the cut out activates repeatedly check the controller alarm settings, if these are correct the calibrator has a fault. DO NOT USE the calibrator until the fault condition has been removed.

Always use the tools provided when removing inserts.

3. Guidelines for safe use

3.1 Always handle the Calibrator as if the block is hot. Do not touch the top surface of the block.

3.2 Position the Calibrator in such a way that it cannot be accidentally knocked from the bench. Pay careful attention to the positioning of the mains lead to avoid tripping.

3.3 Do not cover the Calibrator at any time, or leave flammable material close to the Calibrator.

3.4 When removing hot probes from the block, always place them away from flammable material and make sure that they will not be accidentally touched by anyone.

3.5 Keep all types of liquids away from the Calibrator when in operation.

3.6 Do not use any liquid in the probe holes of the block. (The use of a few drops of demineralised water to improve probe/block contact when calibrating below 70°C (94°F) is permissible with great care. Do not introduce water into the Calibrator unless the block is cold, and the supply is disconnected. Drain the water by inverting the Calibrator after use. Do not boil off remaining water. Care should be taken to avoid any hot inserts falling out of the inverted block.)

3.7 The Calibrator may be switched off and disconnected from the supply without harm even when at maximum temperature. However, the cooling of the block will take considerably longer if this is done, and no temperature indication will be present to warn others that the block may still be hot. The block will take several hours to cool to ambient temperature if the fan is left running (approximately 5 hours to cool to ambient temperature from 550°C / 1022°F).

3.8 If any part of the Calibrator except the block should become hot during use, suspend the operation and disconnect the supply.

4. Removing the inserts

4.1 Use the wire tool to lift the insert. Only lift the insert to a level where you can hold it using the pliers. **Do not try to completely remove the insert using the wire tool.** The wire tool does not provide enough control to allow it to be used to carry the insert.

4.2 Using the pliers, lift the insert clear of the block and put it in a safe place.

5. Setting up the Calibrator

5.1 The Calibrator is designed to give the best performance when operated in a constant temperature environment without draughts. The calibrator should therefore be positioned away from air conditioners and direct sunlight. Please read Section 8 of this manual to achieve the best results from the Calibrator.

5.2 Getting Started

5.2.1 Plug in the mains lead and turn on the Calibrator using the green switch marked supply on the top panel. The cooling fan will start, and the controller will start its self check procedure.

5.2.2 The light above the 'Start' switch will illuminate indicating that the calibrator is in its safety cut-out mode. To switch to normal operating mode press the 'Start' switch. The light will go out and power will be applied to the heater.

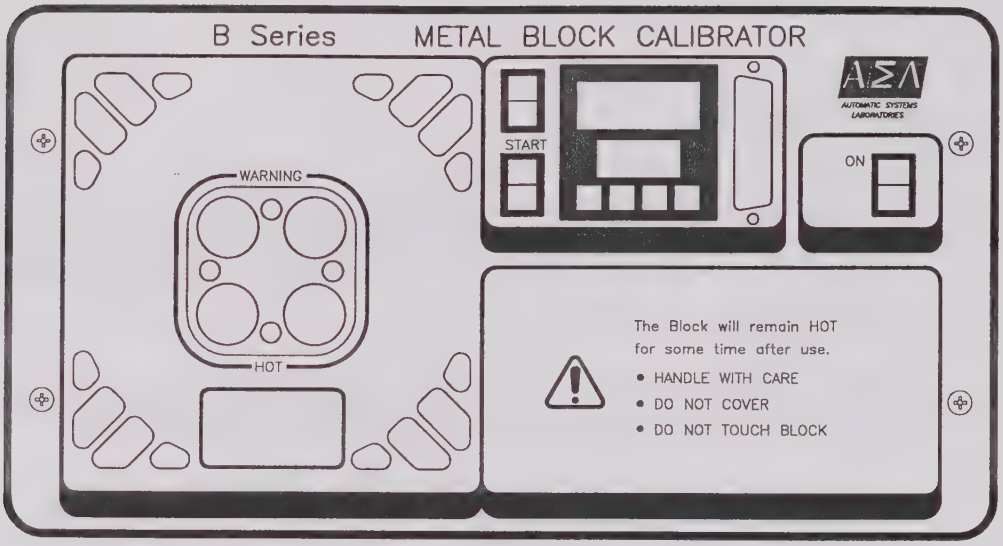


Figure 1 Model B550

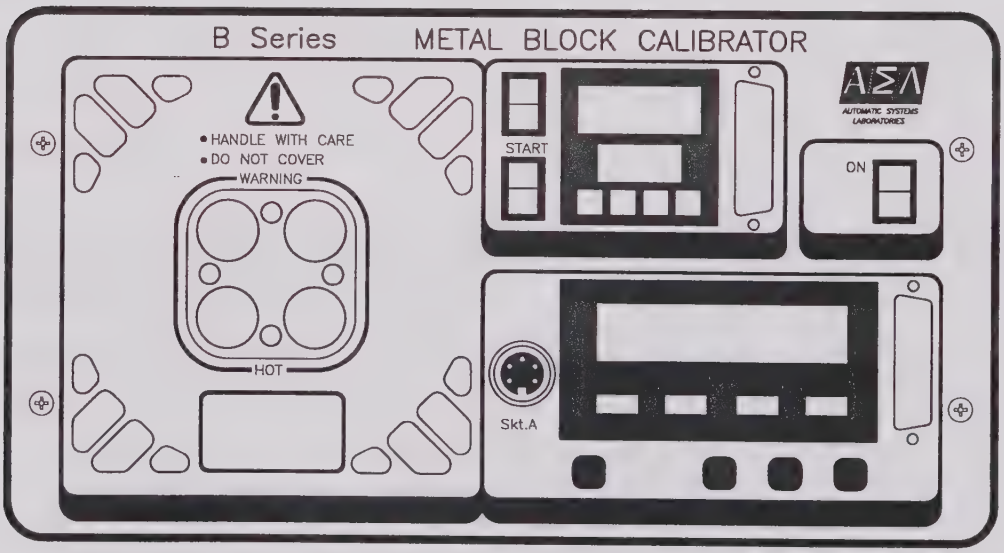


Figure 2 Model B550 with Independent Indicator (II)

5.3 Operating Mode

5.3.1 Whilst operating, the controller will show two temperatures on the controller panel, and the supply switch will be illuminated.

5.3.2 The temperature shown at the top of the controller display is the block temperature. At start up this can be expected to be close to room temperature unless the Calibrator has been recently used.

5.3.3 The lower of the two displayed temperatures is the controller set point. For safety, all Calibrators leaving the factory are set at or below the minimum operating temperature. The last set point is retained in the controller memory. ASL recommends that the set point is returned to the minimum operating temperature following completion of a calibration procedure and before shutdown.

Caution: It is recommended that the probes to be tested are inserted into the block when it is at room temperature. Probes inserted directly into the block when hot may suffer damage due to thermal shock.

5.4 Setting the Temperature

5.4.1 Press the key marked "Scroll" on the bottom right side of the controller.

5.4.2 The lower display will change to SP (set point).

5.4.3 Use the up arrow or the down arrow keys to set the desired temperature on the upper display. The Calibrator will begin to heat, or cool.

5.4.4 After entering the new set point, the operator may return to the previous display by pressing the "Scroll" key a second time.

Note: If this step is omitted, the display will return automatically after some seconds.

5.4.5 Depending on the ambient temperature and the set point temperature, the Calibrator will take some time to stabilise at the new temperature. The stabilisation process is best watched by reading the reference probe inserted in the block. It is normal for the Calibrator controller to indicate an overshoot of some degrees on first approaching a new set point.

5.5 Controller Settings

The Calibrator controller has been set to optimise stability over the full operating range of temperatures. Customers who wish to customise these settings to optimise a particular temperature are referred to the WEST 6100 handbook supplied with the unit. ASL cannot accept any responsibility for damage caused by incorrect setting of the controller parameters by our customers. The Controller configuration settings should not be changed under any circumstances as these relate to the range and alarm functions. Customers are advised to note the configuration settings on their unit before making any changes. See appendix 3 for factory settings.

The controller can be set to tune its own P.I.D parameters. This is not normally necessary except when a greatly varying load (high thermal loss to the block) occurs and the temperature stability of the block is affected.

There are two methods of tuning. Pre-tuning and self tuning, although the latter is not recommended as it can affect the stability at the resolution we are looking for:-

5.6 Pre-Tune Facility

Pre-Tune may be activated as follows:-

5.6.1 With the Controller showing its normal Operator Mode display, depress and hold down simultaneously the Up and Down keys (whereupon the numeric displays will start to flash) until AT indicator blinks once (after approximately three seconds - numeric displays will become static).

5.6.2 Release the Up and Down keys and depress and hold down the "Scroll" key for three seconds (approximately). If the process variable is greater that 5% of input span from the setpoint, the AT indicator will then flash, indicating that the Pre-Tune facility is engaged and operating. If the process variable is within 5% of input span from the setpoint, or if an erroneous key sequence is used, the Pre-Tune facility will not be engaged.

To disengage the Pre-Tune facility:-

5.6.3 Depress and hold down simultaneously the Up and Down keys (whereupon the numeric displays will start to flash) until the AT indicator blinks once (after approximately three seconds - numeric displays will become static).

5.6.4 Release the Up and Down keys and depress and hold down the "Scroll" Key for three seconds (approximately). The AT indicator will then be continuously OFF, indicating that the Pre-Tune facility is disengaged.

Note: Since the Pre-Tune facility is a single-shot operation, it will automatically disengage itself once the operation is complete.

5.7 Self-Tune Facility

The self tune facility as opposed to the pre-tune method can be set on at anytime and will attempt to modify the terms whilst controlling. We don't recommend that this feature is left on permanently because it can affect the stability at the resolution we are looking for.

The self tune facility is invoked by pressing and holding both up and down keys simultaneously until the AT light blinks once. Then release the keys and press the "hand" symbol key. The AT light will then illuminate permanently to show that self tuning is in progress. To cancel, the same procedure is employed.

Note: The Self-Tune facility will not engage if the setpoint is currently ramping.

5.8 Changing from Centigrade to Fahrenheit mode

The Calibrator can operate in Centigrade or Fahrenheit mode.

Firstly the controller parameters need to be noted if they are different to the default ASL settings (for example where different P.I.D terms are used).

To do this enter the "LOC" code (default 8 set by ASL)by pressing the "scroll" button and the up arrow together, the display will show "ULOC" in the lower section. Enter the LOC code using the up and down arrows and press "scroll" to accept.

The controller will now display the operating parameters which can be scrolled through to note the values. Do this by repeatedly pressing the "scroll" key, when back at the start press "scroll" and up together to exit, and the set LED will extinguish. To Alter the range from °C to °F, the input range code has to be changed, a list of these codes can be found in Appendix A of the West Instruments Site Manual. The relevant range codes are listed under the title "For RTD Inputs". The default codes for units leaving the factory are given in Appendix 3 of this manual. To enter the new range the configuration mode has to be accessed. To do this turn the power off. Turn the power back on and within 30 seconds of power-up, hold down the up and "scroll" keys simultaneously for five seconds.

The controller will then show the current input code selected. This can be changed with the up and down arrow keys. As soon as the value is changed the upper display will flash indicating that the new value has yet to be confirmed, when the value is as required it may be confirmed by pressing the "hand" key, whereupon the display will become static. Next return from the configuration mode by pressing "scroll" and up together. Having returned the display will show the temperature, but with all the decimal points showing, indicating that the controller parameters need resetting.

Note: If the input code is changed the values in the set-up mode will return to the default values.

Warning: The setpoint maximum (SPhi) will default to the upper limit of range, as will the high alarm, this would be 800°C or 1472°F with the 1° range.

To enter the set-up mode use the "LOC" code as above and re-enter the values noted down except the values in °C or °F which will need changing to the new scale. This is very important for safety. The alarm values will need particular care.

The default values can be found for °C or °F in Appendix 3 of this manual.

Another precaution would be to indicate on the front panel that the units are now set to Fahrenheit in case someone assumes Centigrade and sets the temperature dangerously high.

5.9 Changing to 0.1°C Resolution

Operation to Change from 1°C resolution (700°C maximum temperature) to 0.1°C resolution (537°C maximum temperature).

This is an operation virtually identical to changing from Centigrade to Fahrenheit where a new range of temperature measurement is chosen. See Appendix 3 for the 4 ranges suitable for the Calibrator. The controller parameters are cleared when the range is changed, so if one range can be fixed upon all the better.

The code number for the Ambient to 537°C (0.1°C) range is 7222, the 1°C resolution range code is 7220.

Now follow the procedure in section 4.9 to set in the new range code.

Note: The range code 7220 invokes a range with the controller of 0 to 800°C. It is for this reason the P.I.D terms will change with this increased input range.

6. The Temperature Monitor (if fitted)

6.1 The Calibrator may be optionally fitted with an independent temperature monitor.

6.2 The monitor is linked to a DIN connector and terminals on front of the Calibrator (see Appendix 2 for wiring details).

6.3 To use the independent monitor connect a PRT to either the DIN connector or the terminals, insert the PRT into the block. The monitor will now display the block temperature in degrees Centigrade.

7. The Serial interface (if fitted)

7.1 The Calibrator controller may be optionally fitted with an RS232 or RS485 interface.

8. Achieving the best results using your Metal Block Calibrator

8.1 This section of your manual is written to help you achieve the best results from your Metal Block Calibrator. ASL has tested this product extensively and the results of these tests can be found in the appendices of this manual. Your Metal Block Calibrator is designed to provide a reference temperature of high stability under the correct operating conditions. The absolute value of this temperature must be measured using a reference temperature probe. The indicated temperature on the temperature controller is not calibrated and cannot be used as a reference. ASL can provide a calibrated reference probe and indicator installed in the Calibrator, or alternatively a more versatile and accurate standalone system. Please ask your representative for details.

8.2 Probe positioning and use of inserts

To ensure the connect orientation of twin holes inserts in the Calibrator Metal Block Calibrator the calibrator is fitted with location spigots in each well. When fitting inserts, ensure that the locating hole in the bottom of the insert mates with the locating spigot.

The top surface of the block is not insulated and therefore has a greater heat loss than the sides and bottom of the block. This gives rise to a variation in temperature at different vertical positions in the block. (see Appendix 1). The block is designed to achieve the minimum possible variation in temperature at any horizontal plane within the block.

To avoid inaccuracies caused by the vertical temperature variations explained above, the user should use a reference probe of the same type as the probe under test. If this is not possible, the reference probe should be designed to match the physical and thermal characteristics of the probe under test as closely as possible. The insertion depth of the Test probe measure point should be exactly the same as the reference probe measure point.

8.3 Probe Contact Area

8.3.1 To achieve the best possible accuracy, all probes that are inserted in the block should have the largest possible contact area with the metal of the block. Users operating at low temperatures may benefit from improving contact by the use of a little demineralized water in the block holes. In this case the few drops of water required should be introduced into a cold block with the supply disconnected. Under no circumstances should any other fluid be used as this will cause a build up of residue and may present a fire hazard. Any remaining water should be removed from the Calibrator at the end of the test by inverting the Calibrator. Care should be taken to avoid any hot inserts falling out of the inverted block.

8.3.2 ASL provide a standard block which is drilled to accommodate 4 T100 type PRTs directly inserted in the block. The dimensions of these holes are optimised for the T100, and should not be used for other probe types. A further 4 Inserts (see below) are also provided with the standard block

Warning: Insertion of the incorrect probe type into these holes may result in inaccurate measurements and/or the probe becoming stuck in the block.

8.3.3 In addition to the predrilled holes, ASL provides inserts which can be factory drilled to order, or drilled by our customers to accommodate different types of probe. As may be seen from the test results in Appendix 1, the temperature difference between inserts may be several tenths of a degree. As previously observed for the probe/block contact area, the contact area between the insert and the block may vary, and the inclusion of a second metal/air/metal boundary will degrade the accuracy that can be obtained when using inserts.

8.4 To obtain maximum accuracy, the customer has two routes to solving this measurement problem.

8.4.1 Use of custom drilled blocks

ASL can provide custom drilled blocks to accommodate most types of probe. This method insures the minimum number of metal/air/metal boundaries between the reference probe and the probes under test, and is ideal for the customer who wishes to qualify multiple probes simultaneously. (Remembering that the probes should all be of the same type including the Reference probe).

8.4.2 Use of "Twin" Inserts

ASL recommends the use of inserts drilled to accommodate 2 probes within the same insert. These "Twin" inserts may be factory or customer drilled, and allow the qualification of up to 4 different probe types in one calibration run. (Each insert must contain one reference probe and one probe under test.). ASL is happy to provide blank inserts for our customers to drill themselves. Due to the possibility of inserts becoming stuck in the block if incorrectly sized, we recommend the use of factory supplied blanks, Twin inserts should be placed in the block as shown in the Fig.3 in order to ensure that the

probes under test are equi-distant from the centre of the block. The locating spigot at the bottom of the well will then engage.

8.5 Supply Voltage Variations

As with all electrical equipment, your B series Metal Block Calibrator is designed to operate most efficiently on a stable electrical supply. Transient variations in supply voltage will vary the quantity of heat output by the Heating element, and may adversely affect the temperature stability of the Calibrator. Users should therefore make every effort to ensure a stable supply during testing and calibration.

8.6 Ambient Temperature Variations

The Calibrator is unaffected by changes in ambient temperature taking place over several hours. Sudden temperature changes will cause a temporary disturbance in block temperature. For best results, we recommend that the Calibrator is used in a draught free environment of constant temperature.

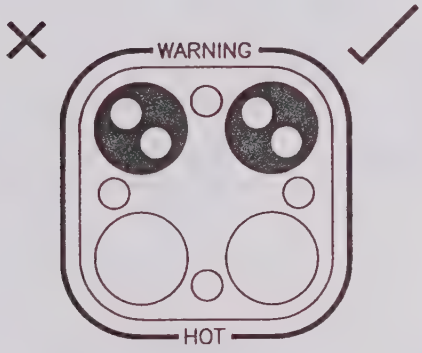


Figure 3 Recommended orientation for twin Inserts

9. Specifications

Supply Voltage:	240/115V 50/60Hz
Range (B550):	+35°C to +550°C, (+95°F to 1022°F)
Range (B700):	+50°C to +700°C, (+122°F to 1092°F)
Stability:	±0.05°C
Well Depth:	150mm
Well Diameter (B550):	4 x 6.5mm dia. & 4 x 19mm dia.
Well Diameter (B700):	4 x 6.5mm dia. & 4 x 18mm dia.
No. of Probes:	up to 12 (inc. reference)

Fuses

Fuse Rating	Supply Voltage
T3.15 Quick Blow	240V
T6.3 Quick Blow	115V

10. ASL Customer After Sales Support

10.1 Your equipment (unless stated otherwise), is covered by a 12 month warranty for parts and labour, but not including costs incurred in returning it back to the factory, from the date of despatch from ASL.

10.2 For all technical support, repair, warranty and service enquiries please contact:

ASL Customer Support Group
Automatic Systems Laboratories Inc.
187 Ballardvale Street.
Wilmington
MA 018887

Tel: 508 658 0000 Fax: 508 658 5444

10.3 Returned Instruments

All returned goods should be sent carriage paid, insured and packed well, to the above address.

10.4 Documentation

The shipment should include:

a) Your goods return note, a delivery note or an export invoice stating clearly GOODS RETURNED FOR REPAIR.
b) Your Company / Establishment order or contract reference number.
c) The name of your purchasing and technical contact.
d) A brief fault report.

10.5 Repair Quotations

We shall be pleased to advise repair costs upon receipt and initial inspection of returned goods.

11. Appendix 1 Performance charts

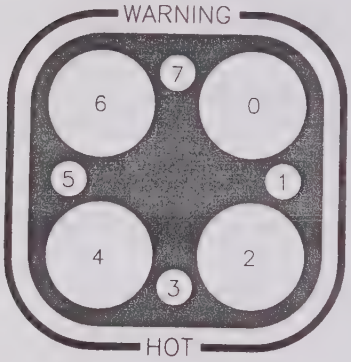


Fig 4

B550 Block Calibrator Test data at 50 DegC. 26/01/94

Statistics	Ch0	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7
Mean	50.056	49.346	50.027	49.380	50.039	49.543	50.054	49.369
Median	50.056	49.347	50.027	49.382	50.038	49.543	50.053	49.370
Standard Deviation	0.019	0.010	0.017	0.013	0.017	0.010	0.018	0.010
Variance	0.000345	0.000108	0.000281	0.000164	0.000296	9.13E-05	0.000333	9.26E-05
Skewness	0.206308	-0.12379	0.228795	-2.64972	0.184023	-0.02925	-0.04435	-0.09848
Range	0.092	0.046	0.081	0.101	0.085	0.039	0.097	0.039
Minimum	50.014	49.322	49.991	49.3	49.999	49.523	50	49.349
Maximum	50.106	49.368	50.072	49.401	50.084	49.562	50.097	49.388
Sum	4755.336	4638.524	4752.592	4641.764	4703.626	4657.001	4705.076	4640.725
Count	95	94	95	94	94	94	94	94
Stability +/- mK.	46	23	40.5	50.5	42.5	19.5	48.5	19.5

Direct Channel Avr.	50.044
Ch0 Var. from Avr.	0.012
Ch2 Var. from Avr.	-0.017
Ch4 Var. from Avr.	-0.005
Ch6 Var. from Avr.	0.010

Maximum Variation between Direct probes
Varmax Direct = 0.029 DegC.

Insert Channel Avr.	49.410
Ch1 Var. from Avr.	-0.064
Ch3 Var. from Avr.	-0.029
Ch5 Var. from Avr.	0.133
Ch7 Var. from Avr.	-0.040

Maximum Variation between Insert probes
Varmax Insert = 0.197 DegC.

B550 Block Calibrator Test Data at 100 DegC. 26/01/94

Statistics	Ch0	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7
Mean	99.137	97.677	99.109	97.854	99.130	97.895	99.155	97.754
Median	99.139	97.677	99.110	97.855	99 131	97.895	99.156	97.755
Standard Deviation	0.014	0.009	0.015	0.009	0.014	0.009	0.014	0.009
Range	0.057	0.042	0.071	0.039	0.063	0.042	0.06	0.043
Minimum	99.107	97.656	99.074	97.834	99.097	97.873	99.122	97.731
Maximum	99.164	97.698	99 145	97 873	99 16	97.915	99.182	97.774
Sum	7237.034	7032.761	7334.078	7045.505	7236.49	7244.253	7337.499	7233.828
Count	73	72	74	72	73	74	74	74
Stability +/- mK	28.5	21	35 5	19.5	31.5	21	30	21.5

Direct Channel Avr.	99.133
Ch0 Var. from Avr.	-0.004
Ch2 Var. from Avr.	0.024
Ch4 Var. from Avr.	0.003
Ch6 Var. from Avr.	-0.022

Maximum Variation between Direct probes
Varmax Direct = 0.046 DegC.

Insert Channel Avr.	97.795
Ch1 Var. from Avr.	0.118
Ch3 Var. from Avr.	-0.059
Ch5 Var. from Avr.	-0.100
Ch7 Var. from Avr.	0.041

Maximum Variation between Insert probes
Varmax Insert = 0.218 DegC.

B550 Block Calibrator Test data at 200 DegC. 26/01/94

Statistics	Ch0	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7
Mean	199.549	196.857	199.519	197.110	199.556	197.030	199.605	196.811
Median	199.549	196.857	199.520	197.109	199.557	197.029	199.607	196.812
Standard Deviation	0.014	0.008	0.014	0.009	0.014	0.010	0.013	0.010
Range	0.066	0.034	0.072	0.039	0.071	0.039	0.066	0.04
Minimum	199.513	196.839	199.479	197.09	199.516	197.008	199.569	196.788
Maximum	199.579	196.873	199.551	197.129	199.587	197.047	199.635	196.828
Sum	18358.48	18307.73	18555.28	18331.23	18558.66	18323.77	18563.28	18303.38
Count	92	93	93	93	93	93	93	93
Stability +/- mK.	33	17	36	19.5	35.5	19.5	33	20

Direct Channel Avr.	199.557
Ch0 Var. from Avr.	-0.008
Ch2 Var. from Avr.	-0.038
Ch4 Var. from Avr.	-0.002
Ch6 Var. from Avr.	0.048

Maximum Variation between Direct probes
Varmax Direct = 0.086 DegC.

Insert Channel Avr.	196.952
Ch1 Var. from Avr.	-0.095
Ch3 Var. from Avr.	0.158
Ch5 Var. from Avr.	0.078
Ch7 Var. from Avr.	-0.141

Maximum Variation between Insert probes
Varmax Insert = 0.299 DegC.

Fig 5 Block at 125 Degrees Celsius

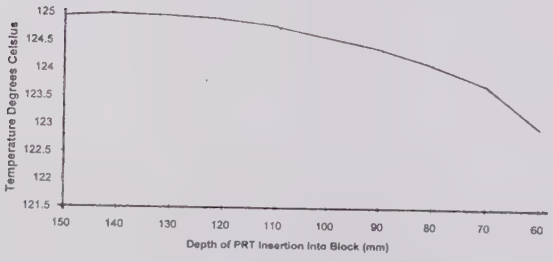
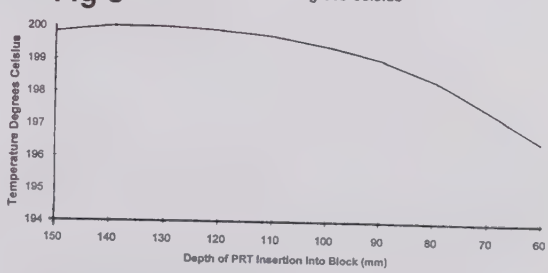


Fig 6 Block at 200 Degrees Celsius



The graphs above, figure 5 at 125•C and figure 6 at 200•C show the vertical gradient of temperature in the B550 block.

The probe used was the T100. The resulting temperature gradient is exaggerated by the insertion depth of the probe itself to the point where the detector within the probe is near the surface of the block.

The stem losses of the probe will also increase as more surface area is exposed to the air. This cooling effect will again reduce the actual temperature.

12. Appendix 2 Wiring connections for DIN connector

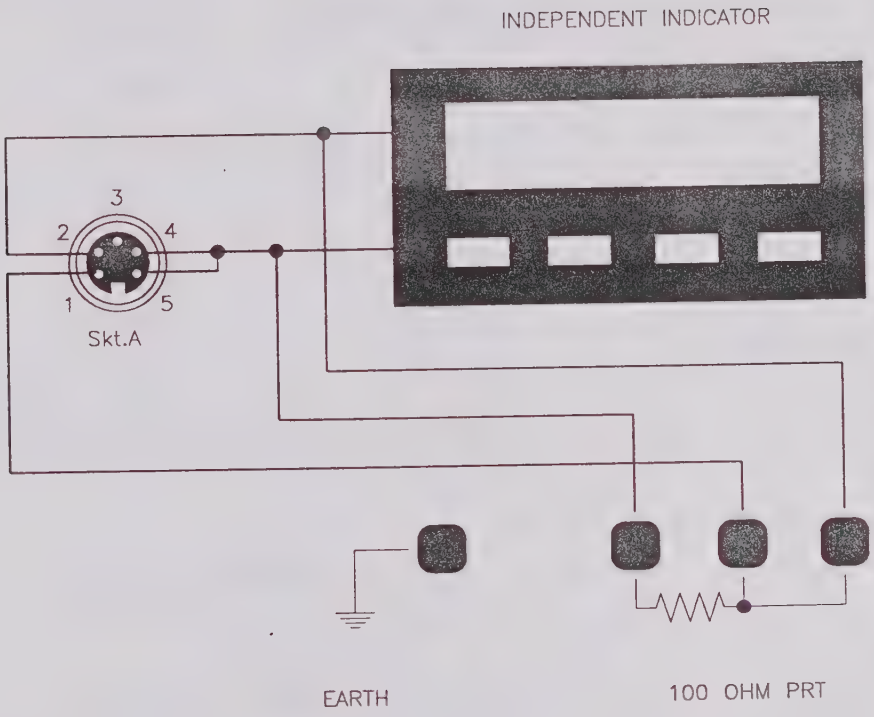


Figure 7 Wiring Diagram for Independent Indicator

13. Appendix 3 Factory Settings

The factory configuration for the WEST 6100 controller are:

Note: Variations for the B700 are shown in brackets
e.g. h-A2=551 (h-A2 = 705)

Centigrade 1° resolution Range: Ambient to 550°C

Configuration mode settings

-inPt = 7220

Ctrl = rEu

ALA1 = P-Lo

ALA2 = P-hi

Inhi = nonE

USE2 = Or-r

Uloc = 8

Set-up mode settings

Filt=0.0	OFFS=0	Out1=Not user settable	
Pb1=1.0°	rSEt=0.32°	rAtE=0.08°	
biAS=25	SPhi=550 (SPhi=700)	SPlo=0	
OPhi=100	Ct1=0.5	h-LA1=0	h-A2=551 (h-A2=705)
LAEn=0	APt=0	PoEn=1	
rPEn=0	SPST=1	CoEN=1*	

Fahrenheit 1° resolution Range: Ambient to 1022°F

Configuration mode settings

-inPt = 7221

Ctrl = rEu

ALA1 = P-Lo

ALA2 = P-hi

Inhi = nonE

USE2 = Or-r

ULoc = 8

Set-up mode settings

Filt=0.0	OFFS=0.0	Out1=Not user settable	
Pb1=1.0*	rSet=0.32*	rAtE=0.08*	
biAS=25	SPhi=1022 (SPhi=1292)	SPlo=32	
OPhi=100	Ct1=0.5	L-A1=32	h-A2=1024 (h-A2=1301)
LAEn=0 A	Pt=0	PoEn=1	
rPEn=0	SPST=1	CoEN=1*	

* If RS485 option is fitted.

*Setting may change during test setup - see documentation shipped with instrument.

Centigrade 0.1° resolution Range: Ambient to 537°C

Configuration mode settings

-inPt = 7222

Ctrl = rEu

ALA1 = P-Lo

ALA2 = P-hi

Inhi = nonE

USE2 = Or-r

ULoc = 8

Set-up mode settings

Filt=0.0	OFFS=0	Out1=Not user settable	
Pb1=1.0•	rSEt=0.46•	rAtE=0.11•	
biAS=25	SPhi=537.0	SPlo=0	
OPhi=100	Ct1=0.5	L-A1=0.0	h-A2=537.3
LAEn=0	APt=0	PoEn=1	
rPEn=0	SPST=1	CoEN=1*	

Fahrenheit 0.1° resolution Range: Ambient to 1022°F

Configuration mode settings

-inPt = 7223

Ctrl = rEu

ALA1 = P-Lo

ALA2 = P-hi

Inhi = nonE

USE2 = Or-r

ULoc = 8

Set-up mode setting

Filt=0.0	OFFS=0	Out1=Not user settable	
Pb1=1.0*	rSet=0.46*	rAtE=0.11*	
biAS=25	SPhi=999.0	SPlo=32	
OPhi=100	Ct1=0.5	L-A1=32.0	h-A2=999.1
LAEn=0	APt=0	PoEn=1	
rPEn=0	SPST=1	CoEN=1*	

* If RS485 option is fitted.

*Setting may change during test setup - see documentation shipped with instrument.

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